By / Legand- Hazem

- Some important notes you must know before studying parasitology:-

→ **Types of hosts:-** قراءة

- Definitive host = D.H = Final host :

It is host that contain adult stage of parasite & sexual multiplication of parasite takes place in.

- Intermediate host = I.H :

It is the host that contain larval stage of parasite in w` asexual multiplication of parasite takes place in.

- Reservoir host = R.H :

Animals that carry some species of parasite as man & act as continuous source for human infection.

Mode of parasitic infection :يحفظ

1- Trans-placental : from mother to her fetus. Ex : toxoplasma.
2- Trans-mammary : through mother`s milk. Ex : ancylostoma.
3- Through skin : during contact e` infected soil or H_2O. Ex : ancylostoma.
4- Through mucous membrane : Ex : trichomonus vaginalis in vaginal m .m
5- Ingestion of contaminated food or drink . Ex : fasciola.
6- Ingestion of improper cooked meat. Ex: taenia solium & taenia saginata.
7- Infected blood sucking arthropod. Ex : malaria.
8- Vectors. Ex: biological & mechanical vectors.
9- Inhalation of eggs. Ex : entrobius.
10- Blood transfusion from infected persons. Ex : malaria.
11- After organ transplantation. Ex : toxoplasma.
12- Along nerve sheath. Ex: naegleria fowleri.
13- Auto-infection : the patient reinfects himself :-
 - External : from anus to mouth by fingers. Ex: cystcercosis.
 - Internal : by anti-peristaltic movement . Ex: entrobius.
 - Super-infection.
14- Domestic animals :
 - Cats. Ex: toxoplasma.
 - Dogs. Ex : hydatid dse.

KING OF PARASITOLOGY

Parasitology include قراءة

Medical helminthology: *Deal e` worms = (helminthes).*

- *Phylum: Flat worms.*
 - *Trematoda = Flukes.*
 - *Cestoda =Tape worms.*
- *Phylum: Round worms.*
 - *Nematoda*

Medical protozology: *Deal e` unicellular parasite.*

- *Phylum: Protozoa.*

Medical entomology: *Deal e` arthropod that transmit dse. to man.*

- *Phylum: Arthropod.*

KING OF PARASITOLOGY

Parasitology
1st term.
Trematoda – Cestoda – Nematoda.

قاعدة **Habitat** لكل الديدان.

1) Ileo ceacal junction , appendix , colon :-
 - Enterobius vermicularis (oxyuris).
 - Trichuris trichura.
2) Small intestine of D.H , R.H :-
 All trematoda except Schistosoma species.
 Paragonimus westermani.
 Cestoda : Diphyllobothrium latum.
 Nematoda : Trichinella spiralis.
 Trichstrongylus colubriformis.
3) Strongyloides stercoralis : الوحيدة
 Light infection Upper S.I
 Heavy infection S.I / L.I / bile duct / pancreatic duct.
4) Small intestine of D.H :
5) Capsulated in pairs in pockets in lung : Paragonimus westermani.
6) Bile duct of D.H , R.H : Fasciola → Gigantica
 ↘ Hepatica

D.H : All → man except :
Ecchinococcus granulosus :- Carnivorous animals.
Multiceps multiceps :- Carnivorous animals.

R.H : 1) Trematoda : Faciola hepatica : Sheep.
Faciola gigantica : Herbivorous animals.
Faciolopsis buski : Dog + pig.
Heterophyes heterophyes : Dog + cat.
Metagonimus yokogawi : Dog + cat + pig.

2) Cestoda : Dog + cat → 2D → Diphyllobothrium latum .
 ↘ Dipylidium caninum.
 Rat + mice → 2H → H. nana.
 ↘ H. diminuta.

3) Nematoda : Trichinella spiralis : Pigs + rats.
Trichostrongylus colubrifermis : Cattles + camels.

I.H : (Nematoda الخاص بـ): **No** I.H in nematodes except 2 worms:-
Trichinella spiralis → man act as D.h , I.H at same time.
Capillaria phillippinensis → Shell fish.

KING OF PARASITOLOGY

- ***N.B*** : *Intestinal disturbance include:-* (***Pathogenesis*** قاعدة)

Nausea – vomiting – diarrhea – dysentery – colic – indigestion

If small intestine parasite. — *if large intestine parasite.*

********** الاسطمبة **********

- *CNS. Manifestations in Cestodes :*

Insomnia, Irritability, Nervousness, Convulsions — *include* → *Due to absorption of parasite toxic products.*

(***Control*** قاعدة)

1) *Mass ttt of infected cases.*
2) *Sanitary disposal of human excreta.* 3 المعروفين دائما إلى آخر المنهج
3) *Pure food & water supply.*

قاعدة ***Diagnosis*** الخاصة بالـ ***cestodes*** فقط.

1) *Clinical : Signs , symptoms of dse.*
2) *Laboratory : Direct :-* المكتوب فى الجدول
 Indirect :- Serological test as ELISA , IFAT for detection of Abs in ptns serum during migratory phase of worm.

Trematoda + flukes قراءة وفهم

Liver flukes	***Intestinal flukes***	***Lung flukes***	***Blood Flukes***
-Fasciola gigantica.	*-Fasciolopsis buski.*	*-Paragonimus*	***Schistosoma species.***
-Fasciola hepatica.	*-Heterophys Heterophys.*	*westermany.*	
	-Metagonimus yokogawi.		

- *S. haematobium = urinary S.*
- *S. mansoni =intestinal S.*
- *S.jabonicum =oriental S.*

N.B *In schistosoma :-* → ***No*** *redia stage.*
No *Encysted metacercaria.*
But *infective stage in furcocercus cercaria.*

	Fasciola gigantica = Large liver flukes	**Fasciolopsis buski** Large intestinal flukes	**Heterophyes Heterophyes & metagonimus yokogawi**	**Paragonimus westermani**
I.H	Lymnea cailliaudi	Segmentina hemispherida	H.H 1st pirenella conica. (amplifier host) 2nd boury,bolty fish (transport fish) M.Y melania libertina. (amplifier host) cyprinoid fish (transport fish)	1st Melania, semisulcospira (amplifier host) 2nd Crab,cray fish=crustacean (transport fish)
Diagnostic stage	Immature egg in stool	Same	Mature egg in stool	Immature egg in stool, sputum
Infective stage	Encysted metacercaria in H_2O or aquatic vegetations (النباتات المائية)	Encysted Metacercaria in aquatic vegetations	Encysted Metacercaria in muscle of boury,bolty fish \| muscle of cyprinoid fish	Metacercaria in muscles of leg , viscera of crabs ,cray fish.
Mode of infection	Infection of contaminated H_2O or aquatic vegetations e` encysted metacercaria after 12 hours encystation	Ingestion of contaminated aquatic vegetations e` encysted metacercaria	Ingestion of improper cooked : boury,bolty fish \| cyprinoid fish infected e` encysted metacercaria	Ingestion of improper Cooked Crab ,cray fish infected e` metacercaria in its muscles ,vescera

	Fasciola gigantica = Large liver flukes	***Fasciolopsis buski*** *Large intestinal flukes*	***Heterophyes Heterophyes & metagonimus yokogawi***	***Paragonimus westermani***
ttt.	*1) Medical:* *- Bithional.* *- Triclabendazole.* *2) Surgical removal of ectopic worms.*	*Praziquantal*	*1) Praziquantal.* *2) Yomesan.*	*Praziquantal*
Disease	*Fascioliasis -Liver rot*	-	*Heterophyiasis* \| -	-
Pathogenesis	*(6/6)* *a) Penetration of peritoneal cavity by metacercaria ⟶ peritonitis.* *b) Migration through liver tissue ⟶ toxaemia , necrosis then fibrosis* *c) Eosinophilia.* *d) Ectopic worms :- metacercaria may loose its way ⟶ reaching ectopic sites as lung, brain fibrosis , abscess occurrence.*	*(3/3)* *1) toxic metabolites generalized edema* *2) attachment of parasite to mucosa Hge.+ulcer +الاسطمبة* *3) heavy infection:-* *a)anemia* *b)intestinal obstruction* *c)worm occupy stomach + large intestine*	*1) Light infection : asymptomatic* *2) Heavy infection : severe diarrhea* *3) Egg emboli [uncommon]* *Ova reach general circulation by submucosal lymphatics ⟶ ectopic sites ⟶ granuloma & fibrosis.* *heart ⟶ H.F* *brain ⟶ Hge.* *Lung ⟶ military nodular shadows.*	*1)Parasitic granuloma* *- tubercle like absess* *- diffuse pulmonary fibrosis* *- pneumonia* *2)Dse. Is insidious in its onset* *(TB البعض يفتكره)*

	e) development in bile duct:- - Chronic irritation :- - adenoma. - biliary endothelial hyperplasia. - fibrous thickening of duct. - Dilatations : - pressure atrophy on adjacent liver cells periductal fibrosis - Obstruction by worms:- - calculi - cholangitis - 2ry infection - Rupture ⟶ liver abscess formation. + الاسطمبة	3)**Symptoms:** Anemia , malaise, eosinophilia , fever , enlarged tender liver , pain in Rt. hypochondrium + الاسطمبة		3) **Symptoms** - Fever - Cough - Hemoptysis + **Sputum** - Viscous - Bloody - Show eggs

	Fasciola gigantica	Fasciolopsis buski	Heterophyes Heterophyes & metagonimus yokogawi	Paragonimus westermani
Diagnosis	1)Clinical signs & symptoms of dse. 2) Lab: a) Direct : - Stool examination for detection of eggs.	→ Same	→ Same	→ Same
	- Direct blood film for eosinophilia - Aspiration of duodenal content for detection of eggs.	→ Same	→ Same	→ Same
	b) Indirect : - serological test : for detection of Abs in ptns serum during migratory stage of worm. Ex: ELISA , IFAT.	b) Indirect : → Same	→	→ Same
Control	3 المعروفين + - Snail destruction - Avoid defecation in H_2O - Proper cooking of aquatic vegetation.	→ Same	3 المعروفين + proper - cooking - frying of fish - grilling of fish	→ Same

Other topics important :

*1) **Fsciola hepatica = sheep liver flukes** :*

Similar to fasciola gigantica in all except only 3 differences

a) R.H : as before

b) I.H : lymnea trancatula

c) Pathogenesis : in sheep : adult cause ⟶ liver cirrhosis & ascitis.

in man : young adult cause ⟶ feed on liver tissue.

⟶ Inflamation , necrosis [liver rot].

⟶ Eosinophillia [allergy] .

Symptoms , the rest [diagnosis – ttt – control] same as fasciola gigantica

*2)**Human fascioliasis** : Def. : Infection of man e` fasciola worm.*

Types :

1- True infection: M/I : ingestion of contaminated H2O e` encysted metacercaria

C/P : - liver rot (explain). - early : irregular leukocytosis & eosinophilia. - later : marked anemia.

2 - Halzoun: M/I : - ingestion of raw liver of sheep containing living fasciola - fixation of worm to mucous membrane of pharynx - parasitic pharyngitis.

C/P : parasitic pharyngitis - oedema dysphagia - dyspnea & suffocation.

*ttt :- **gargling e` strong alcoholic drink - anaesthesia of parasite - loose its hold on mucosa - drop into mouth – expelled***

- use of emetics : strong vomiting – prevent fixtion of parasite.

- tracheostomy e` laryngeal obstruction to save life.

Control :- proper cooking of animal tissue.

- not eating raw liver.

3- Spurious infection (false) : M/I : ingestion of infected liver e` temporal passage of eggs in faeces.

How to be excluded ? - ask the patient to stop eating liver for 1 week :-

If eggs are still present by repeated stool examination , the patient is realy infected e` fasciola

If eggs disappear by repeated stool examination , the patient is not infected e` fasciola [false].

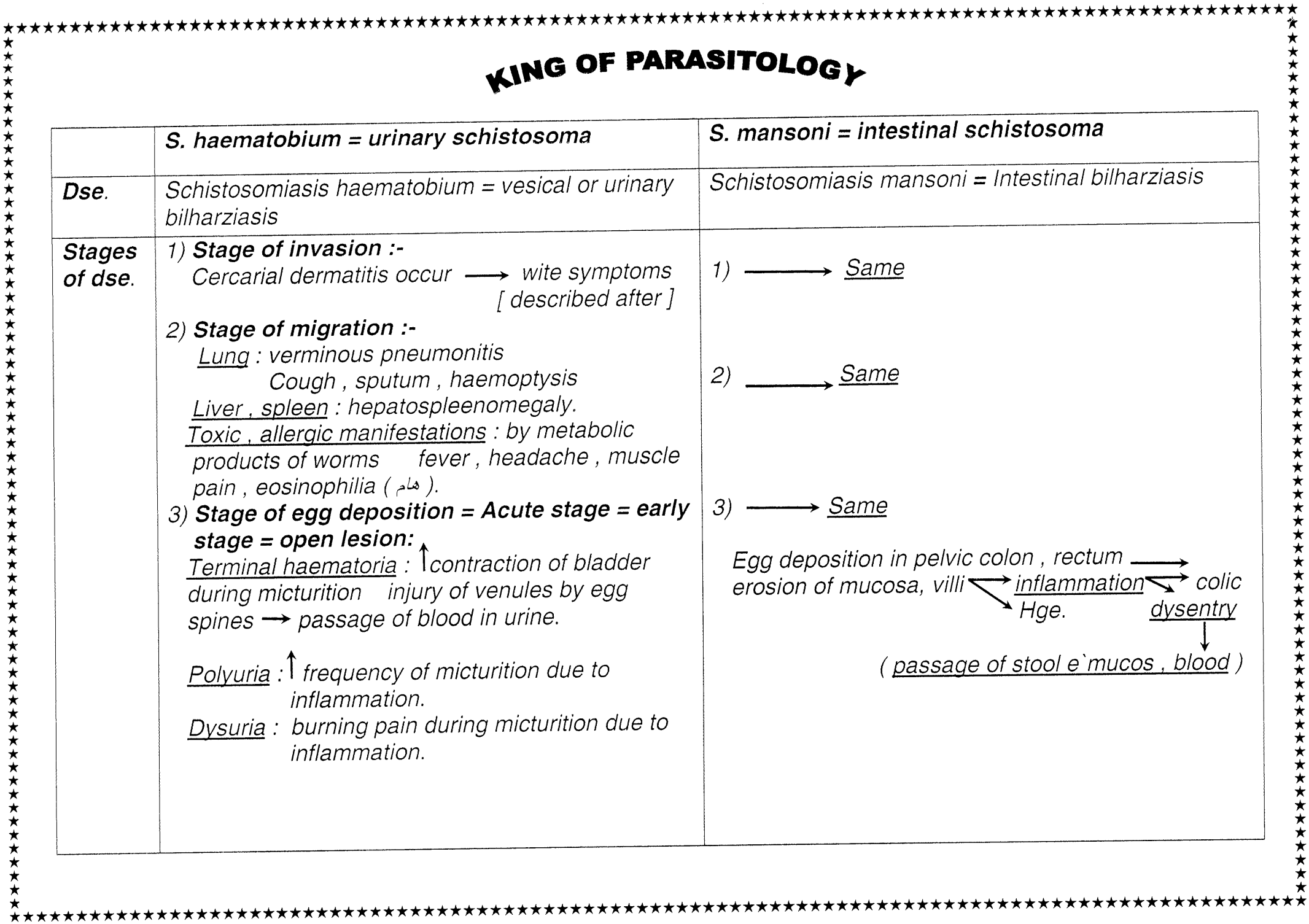
4- Ectopic fascioliasis : Def. : presence of metacercaria in abnormal sites as S.C tissue , lung , brain.

KING OF PARASITOLOGY

	S. haematobium ***= urinary schistosoma***	***S. mansoni*** ***= intestinal schistosoma***	***S. japonicum*** ***= orental schistosoma***
R.H	*No R.H*	*(20) monkey - rodent*	*Cat , dog , pig*
Habitat	*Vesical & pelvic venous plexuses*	*Small branches of → inf. Mesenteric / Portal veins*	*Mesenteric vein of → small large intestine*
I.H	*(snail) Bulinum trancatus*	*Biompheleria alexandrina*	*Onchomelania*
Diagnostic stage	*Egg e` terminal spine in urine [rarely in stool]*	*Egg e` lateral spine in stool [rarely in urine]*	*Egg e` lateral tubercle*
Infective stage	*Furcocercus cercaria* →	*same*	*same*
Mode of infection (M/I)	*1) Drinking H_2O e` Furcocercus cercaria → cercaria penetrate mucos membrane above level of stomach as it is killed by gastric acidity.* *2)During washing or playing in infected canals → cercaria penetrate skin → cercarial dermatitis = ( Bather`s itch).*		
ttt	*1 - Praziquantel* → *2 - Metrifonate*	*1 - 2 - Oxamniquine 3 - Chemotherapy then surgical ttt in portal hypertension*	*Same*

KING OF PARASITOLOGY

	S. haematobium = urinary schistosoma	***S. mansoni = intestinal schistosoma***
Dse.	*Schistosomiasis haematobium = vesical or urinary bilharziasis*	*Schistosomiasis mansoni = Intestinal bilharziasis*
Stages of dse.	*1)* ***Stage of invasion :-*** *Cercarial dermatitis occur ⟶ wite symptoms [described after]* *2)* ***Stage of migration :-*** *Lung : verminous pneumonitis* *Cough , sputum , haemoptysis* *Liver , spleen : hepatospleenomegaly.* *Toxic , allergic manifestations : by metabolic products of worms fever , headache , muscle pain , eosinophilia (هلام).* *3)* ***Stage of egg deposition = Acute stage = early stage = open lesion:*** *Terminal haematoria : ↑contraction of bladder during micturition injury of venules by egg spines ⟶ passage of blood in urine.* *Polyuria : ↑ frequency of micturition due to inflammation.* *Dysuria : burning pain during micturition due to inflammation.*	*1) ⟶ Same* *2) ⟶ Same* *3) ⟶ Same* *Egg deposition in pelvic colon , rectum ⟶ erosion of mucosa, villi ⟶ inflammation ⟶ colic dysentry ⟶ (passage of stool e`mucos , blood)* *Hge.*



S. haematobium	S. mansoni
4) Stage of tissue proliferation , repair , fibrosis = chronic stage = late stage. **Or** called [complications of urinary bilharziasis] . Occur if condition not ttt → complications :- من فوق لتحت **Kidney** : hydronephrosis , pyonephrosis , renal failure. **Ureter** : hydroureter , stricture. **Bladder** : **Cancer** / **Contracted** / **calcified** ← bladder + polyp, ulcer. **Urethra** : fistula , stricture **Genital organs** 1/ pseudo elephantiasis of penis 2/ granuloma in : - prostate , seminal vesicle - ovary , uterus. **+ Egg emboli** occur :- Egg → vesical , pelvic venous plexuses → blood pulmonary artery branches → lung :- 1 – granuloma & fibrosis. 2 – obliteration of pulmonary arterioles → pulmonary hypertension → Rt ventricle hypertrophy → Rt sided heart failure called (**Bilharzial corpulmonale**)	**4) Stage of tissue proliferation , repair , fibrosis = chronic stage = late stage.** 1 – Egg trapped in wall → sandy patches , B. nodules , polyps → #stricture # fistula # sinuses # rectal prolapse 2 – Egg emboli:- a\ Kidney → immune complex dse. b\ 50% of egg pass by blood to liver → granuloma formation around egg → hepatic periportal fibrosis: **Ascitis** , **Portal hypertension**. **Hepatic dysfunction**. **Haematemesis**: occur due to that portal hypertension open portosystemic anastomosis around cardiac & of oesophagus → oesophageal varices → severe haematemesis → death. **Melena** : rupture of veins in rectum. c\ When portal pressure become more than systemic pressure , egg → pass to blood → (S.haematobium أكمل زى)

S. haematobium	S. mansoni
Diagnosis :	
clinical : Signs & symptoms of dse. ⟶	Same [Acute , chronic stage]
a) in endemic area : Hx of haematuria, dysuria.	
b) in mild infection : haematuria manifested after muscular activity.	
c) infection of seminal vesicle : blood in seminal fluid.	
Lab: 1\ Direct :	**Lab: 1\ Direct :**
a) in acue cases [when egg can be detected easily in urine] ⟶ examination of last drop of urine for detection of egg.	a) same except (easily in stool) ⟶ stool examination و أكمل
b) in chronic cases [when egg can not be detected in urine] ⟶ biobsy from mucosa of urinary bladder for detection of : # egg # histopathological lesion of schistosomiasis	b) same except [in stool] ⟶ rectal mucosa biobsy⟶.....
c) viability test = hatching test : (discussed after) (difference between living & dead egg لا بد من شرحه + شرح)	c) rectal swab : (disscussed after) لابد من شرحه
2\ Indirect:	**2\ Indirect:**
a) serological test : def / Ex. As before.	
b) cercarial hullen Rx : schistosoma cercaria + ptn`s serum ⟶ mb will appear around in +ve cases.	the same
c) urine precipitation test : hyper immune serum + ptn`s urine⟶ ppt in +ve cases & used for detection of schistosomal Ag excreted in ptn`s urine.	
d) miracidial immobilization test : when suspected serum is added to motile miracidium ⟶ stop motility if Abs are present.	
e) circumoval precipitation test : when living egg is added to normal saline & incubated for 18 hrs e` ptn serum ⟶ ppt appear around egg in +ve cases due to (Ag Ab Rx).	

	viability test = Hatching test	rectal swab
Sample	Urine - stool	Only stool [S.mansoni]
Method	Add fresh water to sample → 30 min. then examine by hand lens.	Insert gloved finger lubricated e` soap into ptn`s serum → palpate pathological lesions in rectum & put the faecal sample on a slide for examination.
Observation	- If hatching occurs → meracidia can be detected → living egg. - If no hatching occurrence → meracidia can`t be detected → dead egg.	Examination shows S.mansoni egg e` lateral spine.
Specificity	Non specific as it can be done to all S. species	Specific done for S.mansoni only
Importance	Direct test used to differentiate between dead & living egg of S. species . **Living egg** \ +ve hatching . \ Intact meracidium . \ Indicate acute schistosomiasis . \ Translucent. \ Surrounded by RBCs. **dead egg** -ve hatching. Dead miracidium. Indicate chronic schistosomiasis. Opaque. Not surrounded by RBCs.	

KING OF PARASITOLOGY

Other topics

Schitosoma japonicum

Pathogenesis : Disease : Orental schistosomiasis

1) It is more dangerous than other schistosoma due to :-

a) absence of spine.

b) rounded contour of eggs → help their journey inside body

2) It cause katayama syndrome :-

a) def. : condition caused by schistosoma japonicum

b) distribution : Japan , China in which it is present

c) M/I : schistosoma بتاع M/I نفس [discussed before]

d) ttt : Praziquantal.

e) symptoms: mainly liver fibrosis – spleenomegaly +

- affection of mesenteric L.Ns , brain , spinal cord
- fibrosis adhesion of mesentry & omentum.

Cercarial dermatitis = Bather`s itch = Swimmer`s itch

Cause : cercaria of human , non human schistosoma in fresh & marine H_2O.

Pathogenesis: cercaria penetrate human skin → can`t proceed below germinal layer due to rapidly destroyed in skin by host defence mechanism.

Symptoms :- dermatitis → irritation → itching → 2ry bacterial infection.

- Repeated exposure → severe itching → formation of macules & papules.

Diagnosis : history of contact e` H_2O followed by skin rash.

ttt : - 2ry methylene blue → prevent bacterial infection.

- local antihistamine & antibiotic → prevent 2ry infection.
- 5% copper sulfate → relieve itching.

Control : 1) avoid polluted H_2O.

2) snail destruction.

3) rapid drying of skin → prevent cercarial penetration.

Control of schistosoma species

1) Protection = prophylaxis from infection 5 .

2) ttt of infected cases 2 .

3) snail control 3 .

1) Protection = prophylaxis from infection

1\ Health education : - TV media.

- Avoid urination , defecation in H_2O canal.
- Avoid watching , swimming in H_2O canal.

2\ Personal prophylaxis : - Wearing of boots , gloves.

- Use of repellant.

3\ ttt of canal to become safe by :

- Addition of chlonine
- Boiling.
- Storage more than 48 hours.

4\ Rapid drying of wet skin to prevent cercarial penetration.

5\ Pure H_2O supply.

2) ttt of infected cases

By A) Control of RH.

B) Ptns ⟶ ttt by praziquantal.

⟶ Sanitary disposed of human excreta .

3) snail control

Physical method	**Biological method**	**Chemical method**
- Dryness of canals. - Clearance of weeds عشب to prevent feeding of snails. - Wine screens at inlets مدخل of canals to collect snails.	Using:- - Pathogens. - Toxic plants to snails. - Natural enemies to snail as ducks & other snails.	Using chemical substances to kill snails Ex:- 1) Baylucide 2) Na pantaclona phenate. 3) Copper sulphate :- a) Widely used in Egypt. b) Not effective against egg of snails. c) Effective against newly hatched snails , so applied every 3 months.

KING OF PARASITOLOGY

Cestodes

Cestodes can be classified to :- قراءة و فهم

A\ According to common genital pores in reproductive system :-

1) Ventral in pseudo phyllida
include :
- Dyphyllobothrium latum
- Dyphyllobothrium mansoni

2) Marginal in cycloplyllida
include :
- Taenia saginata
- Taenia solium
- Ecchinococcus granulosus
- Ecchinococcus multilocularis
- Multiceps Multiceps
- Hymenolepis nana
- Hymenolepis deminuta
- Dipylidium caninum

B\ According to its habitat in man :-

1) Intestinal [where man act as D.H]	2) Extra intestinal [where man act as I.H]
- Dyphyllobothrium latum	⟶ - Plerocercoid larva of D.L = Sparaganum.
- Taenia saginata	
- Taenia solium	⟶ - Cystcercus cellulose of Taenia solium.
- Hymenolepis nana	⟶ - Cystcercoid larva of Hymenolepis nana.
- Hymenolepis deminuta	- Hydatid cyst of Ecchinococcus granulosus or Ecchinococcus multilocularis.
- Dipylidium caninum	- Coenurus cyst of Multiceps Multiceps.

	Dyphyllobothrium latum = Broad fish tapeworm	**Taenia saginata = beef tapeworm**	**Taenia solium =pork tapeworm**	**Ecchinococcus granulosus = hydatid worm**
I.H	1st cyclop 2nd salmon,trout	cattle	Pig - man	Cattle ,sheep, man
D.S	-Egg or mature segment in stool	**-Egg or gravid segment crawling out of anus.**	-Egg or gravid segment in stool.	-egg in stool of D.H (خلى بالك)
I.S	Plerocercoid larva in salmon or trout	Cystcercus bovis in skeletal muscle of cattle.	**cystcerus cellulosa in sk. Ms. of pigs.** **-egg :- cystcercosis**	Unilocular hydatid cyst in tissue of I.H
M\I	Ingestion of improper cooked salmon or trout infected e` Plerocercoid larva.	Ingestion of improper cooked beef meat infected e` Cystcercus bovis	- Ingestion of improper cooked pork meat **infected e`** cystcerus cellulose - Egg [ingestion or auto infection ⟶ cystcercosis.	- ingestion of contaminated food or H_2O e` dog stool. - close conact e` dog ⟶ hydatidosis.

	Hymenolepis deminuta = Rat tapeworm	*Dipylidium caninum = Dog tapeworm*	*Hymenolepis nana = Dwarf tapeworm*	*Multiceps Multiceps Cid tape worm = Taenia .m*
I.H	*Rat , flea beetle cockroaches*	*Human flea , dog louse*	*Flea larva , beetle , man*	*Same as Ecchinococcus granulosus*
D.S	*Egg or gravid segment in stool*	***Egg capsules or gravid segment in stool [rarely egg]***	*Egg in stool*	*Egg in stool of D.H (خلى بالك)*
I.S	*Cystcercus cystcercoid*	*Cryptocystic cystcercoid*	*- Cystcercus cystcercoid* *- egg*	*Co-enurus cerebralis cyst in tissue of I.H*
M.I	*Ingestion of contaminated cereals (حبوب النبات) e` insect vector.*	*Ingestion of contaminated food or H2O e` infected flea or dog louse.*	*- Ingestion of contaminated food or H_2O e` flea larva or egg.* *- autoinfection.*	***- Ingestion of contaminated food or H2O e`dog stool.*** ***- close contact e` dog.***

Cestodes اسكيمة الـ

Pathogenesis :- *1\ Light infection ⟶ Asymptomatic.*

2\ Heavy infection :-

1) intestinal disturbance : as before الاسطمبة .

2) CNS manifestation : as before.

+

characteristic symptoms of each worm.

Diagnosis: *1\ clinical :- signs , symptoms of dse.*

2\ Lab :-

1) Direct : تختلف حسب الدودة .

2) Indirect : as before.

	Diphyllobothrium latum	**Taenia saginata**	**Taenia solium**	**E. granulosus**
Dse.	Diphyllobothriasis	Taeniasis saginata	Taeniasis solium	**Hydatidosis=Hydatid dse**
Patho genesis	As before + megaloblastic anaemia → due to competition for vit. B_{12} () parasite & host → vit. B_{12} def.	As before + 1) Appendicitis : when mature segment enter its lumen 2) Loss of weight due to :- a) loss of apetite b) consumption of much of ptns food by parasite	1)When man act as DH : parasite in S.I → Same 2) When man act as I.H : cystcercus cellulose in extra intestinal tissue → cystcercosis	(discussed after)
Diagnosis	As before + 1) detection of egg in stool 2) blood picture for anaemia 3) segment passing out e` stool ——— for counting lateral uterine branches: If 9 → taenia solium If 18 → taenia saginata As egg are same () them.	Difficult in 1st 3 months of infection till adult worm is developed : As before + 1- detection of egg in : a) stool. b) perianal region by perianal swab. 2- examination of gravid segment () 2 slides →	Same as taenia saginata	

	Hymenolepis deminuta	*Dipylidium caninum*	*Hymenolepis nana*	*Multiceps multiceps*
Dse.	*Hymenolepiasis deminuta*	*Dipylidiasis*	*Hymenolepiasis nana*	*Co-enurosis*
Patho-genesis	*As before*	*As before + eosinophilia*	*As before*	***1) Man:*** ***symptoms of increase intracranial tension*** ***→ symptoms depend on its location in CNS.*** ***2) Animals :*** ***- disturbed gait – ataxia*** ***- blindness : easily attached by foxes***
Diagnosis	*As before + Detection of egg , gravid segment in stool*	*As before + Detection of egg , gravid segment & egg capsules in stool*	*As before + Detection of egg in stool*	*Diagnosed as brain tumor but identified after surgical removal.*
الخلاصة : جملة (dignosis of cestodes → D.S) هو نفسه ما عدا T. multiceps				

	D.latum	***Taenia saginata***	***Taenia solium***	***E.granulosus***
ttt	*- Yomesan → Same* *- Praziquantal → Same* *- Vit. B12 + iron*		*- Albemendazole → Same + corticosteroids* *- Surgical removal → Same*	*- Mebendazole* *- Sterilization*
Control	*Same as control of Heterophys Heterophys*	*3 المعروفين + Destruction of larva by :* *a) deep freezing at 10c for 10 days.* *b) proper cooking of meat at 65c for several hours or at 75c for several minutes.*	*Same as taenia saginata*	*Discussed after*

	Hymenolepis deminuta	Dipylidium caninum	Hymenolepis nana	Multiceps multiceps
ttt	Yomesan ⟶		- Same - praziquantal	- Surgical remaval
Control	+ المعروفين 3 Elimination of rat , mice by poisons	1- Control of insect vector by D.D.T 2- elimination of infected dog. 3- Avoid contact e` dog.	Same as Hymenolepis deminuta	As E.granulosus (discussed after)

	Sparagnosis	Cysticercosis
Def.	Pressure of sparganum <u>mansoni</u> or <u>proliferum</u> in human tissue.	Pressure of cystcercus cellulosa of T. solium in human tissue.
Role of man	Man act as I.H in a blind cycle ⟶	Same
I.S	- sparganum <u>mansoni</u> (plerocercoid) - sparganum <u>proliferum.</u>	cystcercus cellulosa
M.I	1) drinking H2O e` infected cyclop e` plerocrcoid larva. 2) eating raw tissue of 2nd I.H as frogs e` plerocrcoid larva. 3) local application of frogs tissue as poultices to inflamed tissue.	1) ingestion of contaminated food or H_2O e` egg or gravid segment. 2) <u>Auto infection</u> : a) External (anus ⟶ mouth) b) Internal : vomiting – use of emetics
Site of affection	S.C tissue + eye mainly ⟶	Same + brain + heart + sk. Ms. (if severe death)
Type of lesion	Chronic inflamation ⟶ fibrosis ⟶ calcification	same
ttt	Surgical removal of infected nodules	Same as taenia solium

	Sparagnosis	Cysticercosis
Diagnosis	After surgical removal of infective plerocercoid larva.	**Clinical** : signs , symptoms of dse. + e` history of infection e` T. solium. **Lab** : **Direct** : 1) Biobsy of S.C tissue for histopathological examination. 2) C.T scan , ultrasonography for brain lesions. **Indirect** : - serological test (as before). - blood picture for eosinophillia .
Control	1) Avoid eating raw tissue of 2nd I.H 2) Boiling H_2O to kill Cyclops. 3) Mass ttt of infected animals. 4) No fermentation e` animal tissue.	1) Pure H_2O supply. المياه 2) Proper washing of vegetables. الخضروات 3) Personal cleanliness. النظافة 4) Avoid using emetics to prevent internal auto infection. الأدوية 5) Early ttt of adult worm to prevent auto infection. الدوده

Other topics

Dyphyllobothrium mansoni = Spirometra mansoni :
Differ for D.latum in : 1) No R.H 2) D.H : Dog + cat. 3) 2nd I.H : Frogs , snakes 4) I.S : plerocercoid larva in 2nd I.H

E.multilocularis [alveolar or multilocular hydatid cyst] : differ from E. granulosus in : 1) D.H : Foxes 2) I.H : Rodents.

Q : Why yomesan should be avoid in ttt of T.solium infection ?
A : → Because yomesan disintegrates worm → release of large numbers of egg in intestinal lumen → internal autoinfection → Cystcercosis .

N.B : Both E.granulosus + E. multilocularis cause hydatid dse. = hydatidosis .

KING OF PARASITOLOGY

Hydatid dse = Hydatidosis هام

Def. : Presence of unilocular hydatid cyst + [larval stage of E.granulosus] or multilocular hydatid cyst [larval stage of E.multilocularis] in human tissue.
→ Man act as 2nd I.H in cycle.

M.I : - **Directly** : by handling dogs whose hairs are contaminated e` eggs.
Indirectly : ingestion of contaminated food or H_2O e` eggs of E.worms.

Pathogenesis :

1) General effects = complications:
- 2ry infection – abscess formation.
- Rupture :-
 a) release of hydatid fluid → anaphylactic shock.
 b) implantation of germinal cells into other tissue → 2ry cysts.

2) Local effects :
Depend on number , size , site of cysts :-
- hepatic hydatid cyst → indigestion , jaundice.
- pulmonary hydatid cyst → dyspnea , cough , hemoptesis.
- cerebral hydatid cyst → epilepsy ,symptoms of increase intracranial tension

Fate : 1) Spontaneous cure.
2) Shrinkage , calcification.
3) 2ry infection , abscess.
4) Rupture → dissemination .

ttt : Same as E.granulosus +
Sterilization → some of hydatid fluid is replaced by 10% formalin , saline → kill germinal layer & scolices.

Control : Same as D.caninum except :
(Control of insect vector by D.D.T) تشيل
(Destruction of infected organ in slaughter house & prevent infection of dogs) و تضع مكانها

Diagnosis : **Clinical** : - history of contact e` dogs.
- cystic masses e` hydatid thrill.

Lab : Direct : 1- X-ray , ultra sonography , C.T scan.
2- aspiration of hydatid fluid (may lead to leakage of fluid – anaphylactic shock) .

Indirect : 1- serological test : as before.
2- blood picture for eosinophilia.
3- Casoni test : هام

a) intradermal skin test.
b) Used for indirect diagnosis of hydatid cyst.
c) 0.2 cc of sterile hydatid fluid injected I.D in one arm (test arm) & similar amount is injected to another arm (control arm).
d) In +ve cases : test arm show local wheal of eodema & erythema e`in 20 minutes & a delayed Rx after 24 hours.

KING OF PARASITOLOGY

Nematodes

Classification

Intestinal nematodes

Small intestine
- *Ascaris lumbercoides*
- *Trichinella spiralis*
- *Hook worms*
- *Strongyloides stercoralis*
- *Trichostrongylus colubrfermis*

large intestine
- *Enterobius vermicularis*
- *Trichuris trichuria*

Tissue nematodes
- *medina worm*
- *Filarial worms*

N.B قراءة هامة

Types of nematodes female *:*
- *larviparous : female lay larva directly.*
- *oviparous : female lay egg containing immature embryo.*
- *ovoviviparous : female lay eggs containing mature larva.*

Types of nematodes larva *:*
- *Rhabelitform larva.*
- *Filarform larva.*
- *Microfilaria.*

للفهم فقط

Transmission of nematodes:

Ingestion of eggs
- directly (oxyuris)
- after maturation
 - ascaris
 - trichocephalus

ingestion of larva
- *trichocephalus*
- *trichinella spiralis*
- *medina worm*

skin penetration
- *hook worm*

insect bite
- *filarial worm*

	Ascaris lumbercoides = giant intestinal = round worm	**Trichinella spiralis**	**Enterobius vermicularis = oxyuris = pin worm = seat worm**	**Trichuris trichuria= trichocephalus trichuris = whip worm**
D.S	Immature egg in stool	Immature larva migrating or in muscles.	Female or larvated egg in stool or peri-anal region	Immature egg in stool
I.S	Egg e` 2nd stage rhaditiform larva	Trichina capsule in active striated muscle.	Larvated egg. →	Same.
M.I	Ingestion of contaminated food or H_2O e` eggs	Ingestion of improper cooked pork meat infected e` trichina capsule.	1) Ingestion of egg. 2) External auto-infection.	Ingestion of contaminated food or H_2O e` eggs [as ascaris]
	Capillania phillippinenesis	**Hook worms** **- Ancylostoma deudenal** **- Necator amricanus**	**Strongyloides stercoralis = Dwarf thread worm**	**Trichstrongylus colubrefermis**
D.S	Egg , larva,adults in stool.	Egg in stool.	Larvated egg in stool.	Egg in stool.
I.S	2nd generation larva in shell fish.	Filariform larva →		same
M.I	Ingestion of improper cooked shell fish w` is infected.	**-Necator A. : skin penetration** -Ancylostoma :- 1) Skin penetration. 2) Transmammary. 3) Transplacental. 4) Oral e`out pulmonary migration.	1) skin penetration + while walking base foot. 2) Transmammary. 3) Organ transplantation. 4) Autoinfection:- **- internal in constipation** **-external through perianal skin**	Ingestion of contaminated food or H_2O e` filariform larva.

Ascaris lumbercoides	Trichinella spiralis	Enterobius vermicularis	Trichuris trichuria
Disease: Ascariasis **Pathogenesis:** Dse pass in 2 stages: A) Migratory stage: - Lung : light infection :- asymptomatic heavy infection:- loffler`s syndrome cause : larva pass to lung allergic Rx – inflammatory cells attach larva – destruction of lung tissue . C/P : cough – haemoptysis Increase eosinophillia Lobar pneumonia Larva pass e` sputum. - General circulation : heavy infection : larva pass to arterial circulation to all part of body – visceral larva migrains B) Intestinal stage : 1- intestinal disturbance الاسطمبه 2- products of dead ,living worm → irritability , insomnia , fever. 3- dyspnea: malabsorption of ptns due to production of anti enzymes interfere e` ptn digestion. 4- loss of appetite – vit A,C deficiency ,malnutrition. 5- heavy infection : intestinal obstruction as :-	Trichinosis = trichiniasis = trichinellasis Dse. pass in 3 stages: A) Intestinal stage: - 1st week of infection : worm attach to mucosa-ulceration & 2ry infection الاسطمبة +mild to severe gastro-enteritis - duration: short if if local tissue immunity overcome worm & long if corticosteroid is used. B) Migratory stage: 7-21 days larval migration – Ag/Ab Rx – deposition of immune complex in vascular wall & cress reactivity occur () vascular Ag , parasitic Ag → vasculitis manifested by : 4p ms. pain , painful breathing , peritoneal eodema , eosinophillia + fever , headache C) Stage of encystment , repair Due to invading ms. by larva Host tissue Rx - in CNS : granuloma formation - after 3 days of invasion : hyaline degeneration of ms. C/P : In muscle: increase ms enzyme increase ms stiffness	Entrobiasis – oxyuriasis 1- Intestinal disturbance الاسطمبة . 2- Appendicitis :30% of cases are due to entrobiasis. 3- Passage of female vagina or fallopian tube → vaginitis , salpingitis. 4- Migration of female to → peri-anal region → irritation → itching → 2ry infection → pruritis ani. + insomnia , irritability & can`t concentrate.	Trichuriasis 1- Intestinal disturbance الاسطمبة 2- Anaemia either :- a) hypochromic due to suction of blood by parasite. b) hyperchromic due to toxic substances secretions. 3- Dysentry & rectal prolabse due to :- a) weakness of vator ani ms. b) heavy infection. c) edema of rectal mucosa. 4- Appendicitis. 5- increase eosinoplilia. 6- intestinal wall perforation.

- Appendicular obstruction → appendicitis. - Bile duct obstruction → jaundice. - Intestinal wall perforation → peritonitis. $ Some worm may ascend to pharynx either :- 1-Pass to larynx → suffocation. 2- Pass to middle ear → destruction. 3- Come out of mouth , nose.	increase eosinophilia In CNS : brain tumor psycosis encephalitis In heart : hypertension tachycardia ECG changes Death by myocarditis & encephalitis		

Capillania phillippinenesis	Hook worms: - Ancylostoma deudenal - Necator amricanus	Strongyloides stercoralis	Trichstrongylus colubrefermis
Disease. : Capillarasis **Pathogenesis**: 1-light infection: asymptomatic 2-heavy infection : الاسطمبة + increase hypoprotaenemia & electrolyte imbalance → fatal.	Hook word se =necatorasis = ancylostomiasis Dse. pass in 4 stages: A) Stage of skin penetration → Ground itch {skin rash , maculopapules} B) Migratory stage: loffler`s serum [discussed before] but less severe. C) Intestinal stage: الاسطمبة D) Chronic stage :- a) depend on : - number of worms - duration of infection b) long standing infection : - weakness,fatigue. - dyspnea on exercise.	Cochin china diarrhea = strongyloidiasis Dse. pass in 4 stages: A) Stage of skin penetration : Same but tracks enlarge faster → Larva currens. B) Migratory stage : same C) Intestinal stage : same D) Chronic stage :- a) staetorrhea , weight loss b) malabsorption syndrome c) hyperinfection syndrome :- - due to increase autoinfection → larva pass to lung. - ch` by : الاسطمبة + fever , cough , hemoptysis + larva pass e` sputum.	1-light infection: asymptomatic 2- heavy infection : الاسطمبة + anemia occur due to intestinal Hge.

	- Fe deficiency anemia due to suction of large amount of blood by parasite. - anemia – liver cell injury – decrease protein secretion – hypoproteinaemia - edema c) heavily infected children: - sexual , mental retardation - PICA : increase infection ↓ [habit of eating soil]	- fatal. 5- Disseminated strongyloidasis: - due to increase number of migrating larva in immune - - ptn هام ⟶ so pass to different organs as heart , CNS. - ch` by : depend on affected organ. - fatal. 6-- it is opportunistic parasite. - it is nosocomial infection. - infection last for many years due to autoinfection.	

Ascaris lumbercoides	Trichinella spiralis	E.vermicularis	Trichuris trichuria
Diagnosis : **Clinical :** signs & symptoms **Lab :** 1- eosinophilia 2- detection of : - egg in stool - larva in sputum - egg in stool			same 1- Detection of egg in stool. 2- Protoscopy.
	Direct : 1\ Detection of : - eosinophilia by blood film - larva by blood film - dead males in stool 2\ Muscle biobsy is sure diagnosis : Time : 20 days after infection. Site : from large ms near tension. Method : compress tissue () 2 slides or digest it in HCl then examine.	1- Detection of female or larvated egg in peri-anal region or stool 2- Peri-anal swab : - for detection of eggs. - done in morning before defecation. - repeated for several days before sure diagnosis.	

	Indirect : *1- Serological test :as before* *2- Bachman test = intradermal test :* *Method : I.D injection.* *Result : erythema e`in 10-20min.* *Disadvantage : can`t differentiate () current , previous infection.*	***Types*** ***Scotch adhesive tape swab*** *- hold piece of tape over tongue depressor.* *-roll it over perianal skin.* *-put it on slide e` tokene drop.* *- examine for eggs* ***national institute health swab*** *- fix piece of nonadhesive cellophane to glass rod.* *- roll it over perianal skin.* *- put it () 2 slides.* *- examine for eggs*	
Control : *3 المعروفين* *+* *Control of flies to prevent mechanical transmission .*	*1- proper cooking of meat* *2- proper inspection of meat at slaughter house.* *3- proper freezing of meat at 15c for 20 days.*	*3 المعروفين* *+* *1- cutting of finger nails.* *2- avoid using ptn articles.* *3- infected ptn should sleep alone.*	*3 المعروفين*

KING OF PARASITOLOGY

Capillaria p.	Hook worms	Strongyloides stercoralis	Trchostrongylus colbrefermis
Diagnosis : Detection of egg , larva , adult in stool.	**Clinical** : not useful **Lab** :- **Direct** :- detection of egg in stool **Indirect** :- Serological test : as before.	→ Same **Lab** :- **Direct** :- - stool examination for eggs. - stool examination via bearman`s technique. - stool culture : for detection of filariform larva. - blood picture for eosinophilia & leucocytosis. - x ray in severe infection show mucosal loss & tubular narrowing. - sputum examination. - duodenal aspiration. **Indirect** :- Serological test : as before.	**Clinical** :- signs & symptoms of dse. **Lab** :- 1\ detection of egg in stool. 2\ stool culture for larva.
Control : -	3 المعروفين + avoid waiking bare foot	As hook worms	3 المعروفين

KING OF PARASITOLOGY

Nematoda قاعدة ttt الخاصة بـ

Mebendazole
2A : Ascaris – ancylostoma
2E : Entrobius – hydatid dse.
3T :- Trichinella spiralis .
- Trichuris trichuria .
-Trichostrongylus colubrefermis.
S: Strongyloides.

Albendazole , flubendazole
2A : same
2E : same
1T : Trichuris trichuria
S: same

Thiabendazole
1T : Trichinella spiralis
S : strongyloides :- drug of choice & repeated after 2 weeks to prevent autoinfection.

Pyrantel pamoate
2A : same
1E : Entrobius

Levamusole
2A : same
1T : Trichostrongylus colubrefermis.

+ إضافات لبعض الديدان أيضا
- Ascaris : surgical ttt of complication as jaundice , appendicitis .
- **Enterobius:(mercurial ointment) applied to peri-anal skin to kill female & prevent itching**
- Hook worms : correction of anemia .
- Strongyloides : [Ivermetin] used to prevent hyper infection syndrome.

Capillaria : الدودة الوحيدة التى لا تخضع للقواعد السابقة و يكون علاجها فقط هو الآتى :-
mebendazole # albendazole # ↑↑ ptn in diet # fluid , electrolyte replacement.

B) Extra intestinal = tissue nematodes هام يحفظ

Wucheria bancrofti, *Wucheria malayi* } habitat : lymphatic system.

Loa Loa, *Onchocerca volvulus* } subcutaneous tissue.

Acanthocheilonema perstans, *Mansonella ozzardi* } serous cavities ↘

I.H :- fly culicoides. **R.H** :- chimpanzee. **D.S** :- microfilaria. **I.S** :-

filariform larva in mouth of infected insects

+
Non pathogenic.
Diagnosis : Blood film for microfilaria.
ttt : hetrazan.

KING OF PARASITOLOGY

	Wucheria bancrofti = (Bancroft`s filarial worm)	Wucheria malayi = (malayi filarial worm)	Loa Loa = (African eye worm)	Onchocerca volvulus = Convolute filaria
Ha-bi-tat	Lymph vessles & lymph nodes draining lower part of body	Lymph vessles & lymph nodes draining upper part of body	Subcutaneous tissue free & wandering	S.C tissue corled on itself in fibrous nodule called onchocerca nodule
D.H	man			→ same
R.H	No R.H	Monkeys	Monkeys	Monkeys
I.H	Female of culex , aedes , anopheles mosquito	Mansonia , some species of aedes , anopheles mosquito	Female of crysops fly	Female simulium fly [black fly in sudan]
D.S	Microfilaria			→ same
I.S	Filariform larva in mouth of infected mosquito		except [infected insect]	→ Same except [infected insect]
M.I	Insect bite by insect vector → filariform larva in blood → microfilaria in tissue.			
Con -trol	1) mass ttt of infected ptn by hetrazan. 2) mosquito control by insecticide as D.D.T 3) screening , repellants.			

Wucheria bancrofti	Wucheria malayi	Loa Loa	Onchocerca volvulus
Disease: filariasis = wucheriasis bancroftiase **Pathogenesis :** 1) recurrent attack of lymphangitis, lymphadenitis. causes :-2ry bacterial infection - mechanical irritation - toxins C/P : 2e fever , headache 2i rigor vomiting 2) obstruction of lymph flow : causes : - blockage of lumen by worms - fibrosis of dead worms - fibrosis of lymph nodes & lymphatic vessels. C/P : a- varicosity of lymphatic → edema . b- rupture of varicosity in hollow organ as : U.B → chyluria	- Same	Loaiasis = loiasis 1) migration of adult in S.C tissue → dermatitis → itching. 2) migration of adult in eye → conjunctivitis, congestion , lacrimation & edema of eyelid 3) meningo-encephalitis : due to presence of microfilaria in C.S.F	Onchocercosis , onchocerciasis 1)onchocerca nodule = onchocercomata :- - fibrous nodule formed around adult. - may single or multiple. - site : superficial or deep located over bony prominence to allow its movement. 2S - size : 3cm. - shape : rounded or oval. - ch` by : firm, movable, painless. 2) Eye lesion: - it is serious complications of onchocercosis ends by

Intestine → chylous diarrhea *Peritoneal cavity → chylous ascitis.* *Pleural sac → chylothorax.* *3) elephantiasis* *causes: obstruction of lymph flow due to fibrosis of dead worms → repeated lymphangitis , lymphadenitis.* *C/P : - most common in scrotum , lower limb , breast* *- lymphatic obstruction → lymph edema → fibrosis of underlying skin → 2ry infection may occur.* *- affected skin is : red , hard , swollen , rough , folded due to fibrosis.* *4) diffuse filarial lung dse. =(tropical pulmonary eosinophilia [TPE])* *causes : hypersensitivity Rx occur → damage of microfilaria in pulmonary system.* *C/P :* *- eosinophilia هام .* *- cough.* *- dyspnea.*	*Same but affect upper part of body*	*4) arthritis : acute arthritis & joint effusion.* *5) fugitive swelling :* *- transient swelling appear suddenly & disappear gradually after 3 days e`out suppuration.* *- occur in head , arm , forearm due to hyper sensitivity Rx to* *- adult* *- microfilaria* *- their toxins* *- ch` by :* *- not hot* *- not tender* *- painless* *-variable in size reaching hen`s egg in size.*	*blindness* *- causes:* *a) invasion of eye by micrifilaria → destruction.* *b) hyper sensitivity Rx to :* *- adult.* *- microfilaria.* *- their toxins.* *C/P : -choroiditis* *- corneal opacity* *- retimitis* *- keratitis* *result in blindness.* *3) Skin lesion :* *- localized form affect skin of lower limb.* *- include:depigmentation & hyperpigmentation* *- occur in sudan , yemen* *- causes : due to hyper sensitivity Rx – infiltration of dermis by inflammatory cells – granuloma – fibrosis.* *C/P : - skin : thick dark due to fibrosis.* *- popular rash.* *- itching.* *- finally : atrophy , wrinkling of skin.* *[premature senility in Africa].*
ttt 1) Hetrazan. 2) Iversine. 3) Plastic surgery to correct elephantiasis.	**All same**	1) Same + surgical removal of adults	1) Same + surgical removal of adults

B) Medina worm
= Dracunculus medinensis = guinea worm هام

Habitat : **Deep connective tissue & after fertilization → female migrates to S.C tissue.**
D.H: Man.
R.H : Dog , cat , cattle , horses.
I.H : Cyclop [هام جدا] .
D.S: Rhaditiform larva.
I.S: Filariform larva.
M/I : Drinking HO e` infected cyclop.
Disease : Dracunculiasis.
Pathogenesis : -

1. Larva penetrate intestinal wall → الاسطمبة
2. Migration of female in S.C tissue → allergy.
3. Pressure of female under skin → vesicle formation , itching.
4. C/P :-
 - Arthritis.
 - Pericarditis.
 - Cellulitis.
 - Septicemia.
 - Extra-dural brain abscess.

Diagnosis : -

1) X-ray → show calcified worm in deep tissues.
2) Detection of female ⇄ under skin. / through skin ulcer.
3) Detection of larva by putting skin ulcer in H_2O.
4) I.D test → +ve in 85% of cases.

Indirect

ttt :-

1) Metronidazole.
2) Surgical removal.
3) Manual removal of prolapsed worm by fixing it to a stick & rolling it gradually.
4) Chemical removal by injection of phenothiazine along its course to kill it.

Control:-

3 المعروفين
+
- Control of cyclop by Ca++ oxide , copper sulphate & natural enemies.

KING OF PARASITOLOGY

Other topics
Zoonosis

Def. : dse. transmitted from animals to human.

Classification :-

A) According to method of transmission [هام] :-

1. Direct-zoonosis : infection is transmitted from animal R.H to man directly.
 Ex : trichinella spiralis.
2. Meta-zoonosis : infection is transmitted from animal R.H to man via arthropod.
 Ex : trypanosome.
3. Sapro-zoonosis : **infection is transmitted from non-animal route as soil or H2O to man**
 Ex : fasciola.

B) According to source of infection :-

1. Domestic animals : infection is transmitted from domestic animals to man.
 Ex : ecchinococcosis.
2. Feral zoonosis : infection is transmitted from wild animals to man.
 Ex : African trypanosomiasis.

Role of man : man act either :
- D.H
- I.H
- transport host.
- accidental host.

Visceral larva migrans	**Cutaneous larva migrans = creeping eruption**
Def. : Invasion of human viscera by :- Larva of - Non-human nematodes - Human nematodes in suitable condition.	**Def. :** Invasion of human skin by infective filariform larva of non-human ancylostoma.
Causes : 1. Larva of s.stercoralis by autoinfection 2. Larva of non-human ancylostoma by injection . 3. Larva of toxocara canis , toxocara cati by :- Ingestion → egg hatch in intestine → rhaditiform larva → circulation → tissue → pathogenesis.	**Causes :** Infective filariform larva of non-human ancylostoma by skin penetration.
Pathogenesis : Rhaditiform larva hatch in intestine → penetrate mucosa → venous circulation → liver → Rt. Side of heart → lung → Lt. side of heart → different body organs → + host tissue Rx. → eosinophilic granuloma.	**Pathogenesis :** Filariform larva penetrate skin till germinal layer & can`t proceed below it → Wander in skin producing serpiginous intra-cutaneous tunnels.

KING OF PARASITOLOGY

Visceral larva migrans	Cutaneous larva migrans = creeping eruption
Symptoms : 1- Depend on : - No of eggs. - duration of infection. - tissue invaded. 2- In adults : cause eosinophilia. 3- In children :- a. General : - eosinophilia. - fever. - hypergammaglobulinemia b. Local : - hapatomegally. - hemoptesis , pneumonia. - epilepsy. - inflammation + Hge. In eye.	**Symptoms :** - Movement of larva in tunnels causes :- **3i** : - inflammation. - itching. - indurations. - Occur in hand, feet, legs. - Fate : heal e`in 1 year leaving scar.
Diagnosis: 1\ Clinical :- Triad of :- eosinophilia. - hapatomegally. - hypergammaglobulinemia. In child → confirm dse. 2\ Lab :- a. Direct :- eosinophilia. - hypergammaglobulinemia. - liver biobsy. b. Indirect : - serological test . - I.D test.	**Diagnosis:** 1. Surgical removal of larva from tunnels. 2. I.D test.
ttt : 1. Thiabendazole. → 2. Hetrazan. 3. Corticosteroids : in severe ocular lesion.	**ttt :** 1- Same. 2- Freezing active lesions e` CO_2 snow. 3- Antibiotics : if 2ry infection occur.
Control : 1. Elimination of stray animals. → 2. ttt of pet animals. → 3. Avoid contamination of food or H_2O e` animal excreta.	**Control :** 1. Same. 2. Same. 3. Avoid contact e` soil.

Types of protozoa

Intestinal protozoa

- Entamoaba histolytica
- Giardia lamblia
- Balantidium coli
- Cryptosporidium parvum
- Isospora belli
- cyclospora cayetanensis
- Blastocystic hominis
- sarcocytic hominis , suihominis
- Microsporidia

Blood , tissue protozoa

- potentially pathogenic free living amoema
- Leishmania
- Trypanosome
- plasmodium species
- Toxoplasma gondii
- sarcocytic landmani

Blood protozoa

- Babesia

Urogenital protozoa

- Trichomonas vaginalis

(Class lobosea) Entamoeba histolytica = Amitochondrate protozoan parasite		(Class sporozoa) plasmodium
habitat	Large intestine.	Liver , RBCs of man [I.H] .
D.H	Man.	Female anopheles mosquito :- in w` sexual cycle occur in stomach of mosquito to form sporozoite.
R.H	Dogs , monkeys , rodent (3 O).	Chimpanzee for plasmodium malaria in Africa.
I.H	-	Man :- in w` asexual cycle occur to form blood , tissue schizonts in - liver [exoerythrocytic cycle] . - RBCs [erytherocytic cycle] .
D.S	- Quadrinucleated cyst in formed stool. - Trophozoite in diarrhea. - Trophozoite in extra intestinal tissue.	- Young trophozoite . - Old trophozoite. - Schizonts. - Merozoite. - Gametocytes.
I.S	Quadrinucleated cyst [D.S , I.S].	Sporozoite in saliva of infected mosquito.
M/I	1- ingestion of contaminated food or H_2O e` cysts. 2- auto infection [faeco-oral transmission]. 3- mechanical transmission by flies.	1- Bite of infected female anopheles mosquito e` sporozoites in its saliva. + 2- Blood transfusion [transfusion malaria]. 3- I.V injection [injection malaria]. 4- Transplacental. 5- Organ transplantation. 2 نقل 1 طفل 1 زراعة

Method of reproduction of plasmodium (Alternation of generation):-

- *Asexual reproduction in one host [man] followed by sexual reproduction in other host [female anopheles mosquito].*
- *man act as carrier for gametocytes & remain asymptomatic [I.H تضاف إلى] .*

Entamoeba histolytica

Disease : Amoebiasis.

Pathogenesis :

1- There are 2 strains of E. histolytic trophozoite:-

- **pathogenic strains**
 - called: - magna form
 - tissue form
 - produce cyst
 - cause :
- **non pathogenic strains**
 - called: - minuta form
 - lumen form
 - not produce cyst
 - commensal

1ry intestinal amoemiasis .

1- **acute stage**:

a- amoebic ulcer : [تكوين]
due to release of proteolytic enzymes by parasite → mucosa ulcer.

ch` by :- flask shaped ulcer.
- narrow lumen.
- wide base.

b- acute amoebic dysentery : due to wide spread of ulcer → severe mucosal damage & hge.

Dysentery, diarrhea, trophozoite in stool

2- **chronic stage** :
- healing of ulcer
- disappearance of symptoms especially diarrhea → allow time for encystations of trophozoite → cyst pass in stool.

2ry extra intestinal amoemiasis.

- spread of amoeba through portal circulation → abscess formation in extra intestinal organ Mainly liver.

– include

1- **Hepatic amoemiasis**

a- diffuse amoebic hepatitis.

b- amoebic liver abscess

C/P : -
- **enlarged tender liver**
- pain in Rt. hypochondrium.
- ↑ ESR , fever.
- leucocytosis.

2- **Amoebic pulmonary abscess.**

plasmodium

-

Pathogenesis :

1-**Rupture of RBCs**:

a- reticulo-endothelial system RES : increase phagocytosis of RBCs remnant → hepato-splenomegaly .

b- haemolytic anemia : increase bilirubin level

c- anoxia [O_2 النعدام] : - fatty degeneration of liver & spleen.
- erythroblastic activity of B.M to form reticulocytes

2- **In plasmodium malaria**:

- formation & deposition of immune complex in kidney → nephrotic syndrome :
 - edema.
 - protienuria.
 - ↓ albumin level .

3- **In plasmodium falciparum :**

a) infected RBCs stick to each other → occlude internal capillaries → ischemia → ifarction mainly in brain , large intestine → cerebral & dysenteric malaria.

b) acute intra-vascular hemolysis → Hb → circulation → urine → red urine then converted into met Hb in renal tubules → black urine (black H_2O fever) .

Symptoms :-

1) **Typical malarial paroxysm**:

due to rupture of schizont & release of merozoites e` malarial pigment & metabolic product to circulation.

Stages :

cold stage	**hot stage**	**sweating stage**
C/P: ↑ temperature	↑ temperature	↓ temperature
Shivering	↑ pulse	sweating much
Rigors	headache	exhaustion

ch` by : AAPC
- Appendicitis.
- Amoeboma : granuloma around ulcer → mistaken as malignant tumor.
- ulcer Perforation → Hge.
- Colonic stricture

ch` by :- trophozoite in sputum, ↑ESR, fever, leucocytosis.

3- **Amoebic brain abscess.**

ch` by :- headache , convulsion.

- abscess may rupture → spread of infection.

duration : .5-1 hr | 6-12 hr | several hours

time :- every 36-48 hrs in pl. falciparum.
- every 48 hrs in pl. vivax & pl. ovale.
- every 72 hrs in pl. malaria.

2) **Hepatosplenomegaly.**

3) **Cerebral symptoms:** due to brain infarction in pl. falciparum ch` by headache , coma [صداع و اغماء]

4) **Dysentric symptoms** : due to intestinal infarction in pl. falciparum ch` by bleeding & dysentery [b , d]

5) **Haemolytic anemia :** more severe in pl. falciparum due to a- all ages of RBCs are infected.
b- uninfected RBCs undergo haemolysis.
c- parasitemia is severe due to destruction or RBCs.

6) **Relapse**

def. : reappearance of malarial symptoms after cure

due to activation of dormant stages in liver cells.
- Liver cycle RBCs cycle
Type: 2v - pl. vivax .
- pl. ovale.

7) **Recrudescence**

due to activation of dormant stages in RBCs.
- RBCs cycle only.
Type: all plasmodium.

KING OF PARASITOLOGY

KING OF PARASITOLOGY

Entamoeba histolytica

Diagnosis:

1- **Extra intestinal amoebiasis**.

clinical:

lab: 1- Serological test.
2- Blood picture for leucocytosis
3- Radiography for abscess cavities.
4- Ultra sonography.
5- Trophozoite detection in : - C.S.F : brain abscess
- sputum : lung abscess
- aspirate : liver abscess

2- **Intestinal amoebiasis**.

clinical:

lab: A) **amoebic stool** — **bacillary stool**

amoebic stool	bacillary stool
- acidic bulky	- alkaline scanty
contain :- amoebic trophozoite	- No
- blood	- blood
- charcot leyden crystals	- No
- scanty exudates	- massive exudates
- epithelial cells	- pus cells

B) **methods of lab. Diagnosis**: (5 S)

1. **Stool conc. :using zinc sulfate floatation technique**
2. **Stool culture : on artificial media at 37c for 2 days**
3. **Sigmoidoscopy : to take biobsy from ulcer**
4. **Serological test: to detect copro Ag of E.histolytica**
5. **direct Smear method: smear of stool is emulsified in specific solution : examine for morphology**
 types of smear : saline smear using saline solution
 eosin smear using .5% eosin solution
 iodine smear using 1% iodine solution

plasmodium

clinical: may be diagnostic.

lab:

A) direct : blood film to detect parasite :
time 1- **during febrile attack**

2- **type of malaria**	**stages in peripheral blood**
- **vivax , ovale , malaria**	- all erythrocytic stages.
- **mild falciparum infection**	- ring & gametocytes.
- severe falciparum	- schizont appear.

B) Indirect : 1- PRC detect parasite DNA.
2- serological test
3- dipstick test: detect parasite Ag by placing drop of blood on dipstick impregnated e` Ab.
4- therapeutic test : using antimicrobial drug in sufficient dose :-
if fever disappear e`in 6 days ⟶ cause is malaria
if fever persist e`in 3 days ⟶ cause is not malaria

Control :

1- mass ttt of infected cases
2- mosquito control (arthropod تشرح عناوين من)

ttt :

1- Radical ttt: destroy parasite in RBCs & liver :
premaquine [act on liver forms] + resochine [on RBCs form]
2- Drug resistant malaria : fansidar [new drug]

Control :

3 المعروفين

+

personal cleanliness

ttt :

a) Luminal amoebicides :- act on intestinal amoeba
- flagyl + furamide.
- tetracycline in severe cases.

b) Tissue amoebicides :- act on tissue amoeba
- flagyl + tinidazole + surgical draining of abscess.

3- Prophylactic ttt
- destroy parasite in tissue
- for prophylaxis
- primaquine
 - kill hyprozoite in liver
 - prevent transmission

4- Suppressive ttt
- destroy parasite in blood
- for inhibit clinical attack
- resochine
- chloroquine
- mefloquine
- artimesinine derivative
 - recent
 - strong.

Malarial survey [هام جدا] :

1- **Def** : estimation of malarial endemicity in community.

2- **Factors** : A) Human factors :-
- splenic index : [spleen enlargement].
- Hb index [patient e` uraemia].
- parasitic index [parasites in blood].

B) Mosquito factors :-
- examination of breeding places for larva.
- collection of mosquito to be studied for :-
 - proportion of male to female [increase no. of female ⟶ endemicity].
 - oocyst index [oocyst in its gut wall].
 - sporozoite index [sporozoites in its salivary gland].

KING OF PARASITOLOGY

potentially pathogenic free living amoeba

- **Negleria fowleri**
- **Acanthamoeba species**
 - **GAE** — *In immunocompromized*
 - **CAK** — *in person wearing lenses*

Negleria fowleri

Habitat : *Brain tissue of D.H .*
I.S : *Cyst .*

D.H *: Man.*
D.S : *Amoeboid trophozoite.*

M/I : *inhalation of* → *contaminated H_2O e` cyst during swimming.*
contaminated dust.

Disease: *PAM [primary amoebic meningo-encephalitis].*

Pathogenesis :
1- diffuse meningo-encephalitis → brain necrosis , Hge.
2- ch` by : fever , loss of sense of smell & taste ,
convulsion & coma → cardio – respiratory failure → death.
3- affect children + young adult.
4- fatal disease.

Diagnosis:
1- CSF culture.
2- CSF suspension into fresh H_2O : activate transformation of flagellates form into amoeboid form if +ve case.
3- CSF examination : - detect amoeboid trophozoite.
- differentiate () PAM , Viral encephalitis :-

CSF of PAM	***CSF of viral encephalitis***
- high protein level.	*- low protein level.*
+ RBCs .	
-polymorphs nuclear cells .	*- mononuclear cells.*

ttt : *1- I.V amphotricin B.*
2- continuous observing kidney functions during ttt.

Control : *1- avoid swimming in places fed e` hot spring.*
2- proper chlorination of swimming H_2O pool.
3- don`t immerse your head during swimming.

KING OF PARASITOLOGY

	GAE = granulomatous amoebic encephalitis	CAK = chronic amoebic keratitis
M/I	1- inhalation of contaminated dust. 2- Invasion of ulcerated skin or mm. 3- Sniffing in contaminated H_2O.	1- corneal trauma. **2- Wearing of contaminated conact lenses e` organism** 3- Exposure to contaminated H_2O.
Pathogenesis	1ry infection include skin , mm , lower Rs tract → spread forming granuloma in difficult organ → dessiminated infection in ptns e` AIDs.	Chronic progressive ulcerative keratitis → Perforation → endophthalmitis in ptns e` AIDs.
Symptoms	1- dessiminated infection in ptns e` AIDs 2- headache , convulsion.	1- ocular pain. 2- visual manifestation → blindness. 3- corneal perforation.
Diagnosis	CSF examination by lumbar puncture :- detect trophozoite & cyst.	Corneal ulcer biobsy :- detect trophozoite & cyst.
ttt	1- penicillin , chloramphenicol. 2- Ketoconazole. 3- Surgical removal of granuloma.	- Topical anti-microbial for several months followed by keratoplasty.
Control	Same as Negleria fowleri	1- avoid : - contaminated H_2O. - non sterile solutions. 2- proper lens case.

KING OF PARASITOLOGY

giardia lamblia = intestinalis (oro-intestinal)

Habitat : Upper small intestine – bile duct – gall blader.
D.H : Man mainly children (هام).

R.H : Dog , rodent , pigs.

D.S : 1- Quadrinucleated cyst in formed stool.
2- Trophozoite in severe diarrhea.

I.S : quadrinucleated cyst [D.S , I.S] .

M/I : 1- Ingestion of contaminated food or H_2O e` cyst.
2- Auto-infection [faeco-oral transmission].

Disease : Giardiasis = Lambliasis.

Pathogenesis : 1- affect child + immunocompromized ptns.
2- light infection : asymptomatic.
3- heavy infection :-

If immunocomptent host:	if immuno-compromized host :
- fatty diarrhea.	- persistent fatty diarrhea.
- flatulence.	- fat soluble – vitamin def.
- epigastric pain.	- cholangitis – cholecystitis.
- vomiting.	- hypoprotienaemia.
- malabsorption.	- malabsorption.
- loss of body weight.	- jaundice – biliary colic.

Trichomonas vaginalis (urogenital flagellate)

NB = only pathogenic urogenital flagellate
Habitat :
If male : urinary bladder , urethra , prostate , seminal vesicle
If female : vagina cervix
D.H : Man.
D.S :Trophozoite
I.S : Trophozoite [D.S , I.S].

M/I : 1- Directly : sexual intercourse as parasite can`t live outside body for long period.
2- Indirectly : using ptns articles.
3- Acquired : infection pass from mother to babies.

Disease : Trichomoniasis.

Female	male
- 50% is asymptomatic.	- 95% is asymptomatic
- trophozoites feed on vaginal mucosa → ulcer of mucosa.	- infection involve urethra, urogenital tract → ulcer of mucosa.
- ch` by : dysuria, polyuria, painful sexual intercourse, burning sensation, Itching.	- ch` by : Same. urethral discharge ↓↓ urethritis. prostatitis.

KING OF PARASITOLOGY

giardia lamblia = intestinalis (oro-intestinal)

Diagnosis :

1\ clinical:

2\ Lab - :<u>a) Indirect</u> *: serological test: detect copro Ag of giardia lamblia using immunoassay.*

<u>b) Direct</u> ***:***

1- stool examination :-for trophozoite in liquid stool
-for cyst in formed stool.
2- duodenal aspiration :- for trophozoite.
3- duodenal string test = Entero test.

ttt:

<u>MAT</u> ⟨ *<u>m</u>etronidazole.*
<u>A</u>lbendazole.
<u>T</u>inidazole.

Control :

As Entamoeba histolytica
[personal cleanliness + المعروفين 3]

Trichomonas vaginalis (urogenital flagellate)

Diagnosis : 1\ clinical:

2\ Lab - :<u>a) Indirect</u> *:Serological test : Detect T-vaginalis Ag in discharge as IFAT & DNA probe*

<u>b) Direct</u> *: by finding trophozoite if:-*

female	***male***
- vaginal smear & swab.	*- examination of :*
- vaginal discharge examination.	*urine.*
- culture of discharge on CPLM medium[ملبس] .	*prostatic secretion.*
	semen [best method].
	urethral discharge.

ttt :

1- ttt of male , female is essential.
2- Metronidazole :- effective in both.
3- Male : repeated parasitic manage.
4- Female : vaginal douches to restore normal PH.

Control :

1- early detection , ttt of infected patners
2- condomas : to prevent infection = prophylaxis

KING OF PARASITOLOGY

قراءة وفهم

hemosomatic flagellate = blood tissue flagellate

- Leishmania = leishmaniasis
 - Viscerar L. = kala azar = black fever = dum dum fever
 - Old world
 - L. donovani
 - L.infantum
 - (Called L.donovani complex)
 - New world
 - L.chagasi
 - L.amazonensis
 - Cutaneous L.
 - Old world
 - L.trpica major
 - L.trpica minor
 - L.aethopica
 - New world
 - L.brazilinensis complex
 - L.mexicana complex
 - Muco-cutaneous L.[espundi]
 - L.brazilinensis complex
- trypanosome

Trypanosome

- African T = sleeping sickness
 - Acute
 - Caused by T.rhodesiense
 - Chronic
 - Caused by T.gambiense
- American T. = chaga`s dse.
 - Caused by T.cruzi

N.B [هامة] :-

1- *Both L. & T show 2 or more of morphological forms:*

- *amastigote = leishmanial form.*
- *promastigote = leptomonal form.*
- *epimastigote = crithidial form.*
- *trypomastigote = trypanosomal form.*

2- *Trypomastigote form is D.S of trypanosome & it is 2 types*

polymorphic Trypomastigote
African type خاص بـ

Monomorphic Trypomastigote
American type خاص بـ

Visceral leishmaniasis = kala azar = black fever = dum dum fever (hemosomatic flagellate)	***cutaneous leishmania***
Habitat : *Blood , RES , lung:sputum , meninges:CSF , intestinal mucosa:stool , lung :sputum , mesenteric L.Ns* ***D.H :*** *Man.* ***R.H :*** *Dog , rodent.* ***Insect vector :*** *Sand fly.* ***D.S:*** *Amastigote form [leishmanial form] in infected cells.* ***I.S*** *:* ***Promastigote form [leptomonal form] in saliva of sand fly.*** ***M/I:*** *1- insect bite.* *2-blood transfusion.* *3- contamination of bite wound.* *4- congenital transmission.*	*Similar to visceral L. in all cycle except :-* *R.H & Insect vector* *L.tropica minor : dogs & 1- stomoxys calcitrans.* *2- sand fly :-* *- phlebotomus papatassi* *- sergenti* *L.tropica major : rodents & phlebotomus papatassi* *L.aethopica : rodents & phlebotomus species* *L.mexicana complex { dogs, rodents } & Lutsomia species* *L.brazilinensis complex*

Disease : kala azar , black fever , dum dum fever
Pathogenesis: may be short 2 weeks or long 1-3 months
C/P :
1- dermal leishmanioma : early skin nodule at site of bite
2- double rise fever : most common, twice daily elevations ch` by: dry cough,abdominal disturbance,loss of weight
3- nasopharynx : mucopurluent discharge contain leishmanial bodies.
4- skin : hyperpigmentation : at butterfly area of skin.

Kidney : Amastigote form appear in urine.
Lung: Amastigote form appear insputum.
Brain : Amastigote form appear in CSF.
RECs hyperplasia:-
- liver , spleen :- hepatosplenomegaly , vit B12 def. → megaloblastic anaemia.
- lymph node : enlarged.
- intestinal mucosa : ulcer + malabsorption of iron → iron def. anemia.
- bone marrow : pressure atrophy on mother cells of blood e` - aplastic anemia.
 - thrombocytopenia.
 - neutropenia.

Diagnosis :
1\ clinical: non specific
2\ lab : 1- direct : A,B,C,D
1- Direct blood film : for detection of amastigote.
2- Culture of other samples as urine on NNN media
3- Animal inoculation.
4- Blood culture : for detection of promastigote :-

1-Oriental sore = old world cutaneous leishmaniasis :

- L.tropica minor : dry oriental sore:-
def. :localized skin nodule at site of bite : ulcerate → dry ulcer → 2ry bacterial infection → spontaneous cure.

- L.tropica major : wet = moist sore :
Small itchy papules in lower limb covered by dry scales wet scales → fall → wet ulcer → 2ry bacterial infection → spontaneous cure.

L.aethopica : disseminated cutaneous leishmaniasis:
Single skin nodule : multiple skin nodule covering body → no ulcerate → no spontaneous cure due to :-
1- no cell mediated immunity (CMI)
2- failure of immune response.

2- New world cutaneous , muco cutaneous leishmaniasis:
- L.mexicana complex : Chiclero ulcer.
Single or multiple skin nodule affect ear → destruction of cartilage.
- L.brazilinensis complex:
Muco- cutaneous leishmaniasis
Single nodule at muco-cutaneous junction → organism spread by lymphatic pathway → destruction of internal cartilage so :-
nose : obstruction
larynx : loss of voice
palate : dysphagia

Sample : blood
Medium: NNN.medium
Method : 5cc of blood + Na citrate solution → kept in refrigerator for some hrs → blood settle down leaving plasma above e` layer of white cells in () → take this layer & inoculate it on NNN medium → examine under microscope.

Results **:** [promastigote appear in rosettes groups].

2-Indirect: [serological لا يوجد NB]

a) Specific test:

→ leishmania test :

- I.D test for detection of Ab in ptn serum.
- -ve in early case due to decrease immunity then become +ve 6-8 weeks after ttt.

b) Non specific test:-

- aldhyde test :-

formalin + ptn serum → solidify +ve.

- urea stabamine test :

urea stabamine + ptn serum → white ring at junction +ve

- globulin opacity test:

distilled H2O + ptn serum → opacity +ve

ttt : 1\ specific : pentosam
amphoticin B
pentostam + gamma interferon

2\ supportive : A,B,C,D

- Antibiotics for 2ry bacterial infection
- Blood transfusion in severe anemia
- Care of ptns
- Diet rich in iron , vitamins

tissue destruction :2ry bacterial infection → septicemia → death.

Diagnosis : 1\ clinical :

2\ Lab : 1- Direct: ASA[عصى]

- Aspiration of exudates from periphery of ulcer → stained by giemsa stain for detection of amastigote.
- Culture on NNN media : for detection of promastigote.
- Animal inoculation.

2- Indirect :

1- Serological test : weak test as lesion is localized to skin & not reach blood.

2- Leishmania test : - I.D test : detect Ab in ptn serum.
- +ve e`in several months after appearance of lesion → remain +ve for years [لسنوات كثيرة].

ttt:

1\ systemic : pentostam.

2\ local :-

- cryotherapy
- cleanliness for 2ry bacterial infection
- surgical removal of nedules
- 2% brebrine sulphate
- I.D injection of gamma interferon around lesion

control : *[ptn , dog , sand fly]*

1- mass ttt of ptns
2- elimination of infected dogs
3- elimination of breeding places
4- using insecticides as DDT
5- repellants
6- screening of windows by nets e` narrow openings

control of sand fly

control : *[ptn , dog , sand fly]*

the same

KING OF PARASITOLOGY

African trypanosome = sleeping sickness (haemasomatic flagellate)	***American trypanosome= chaga`s dse***
(chronic sleeping sickness.)	*Caused by T. cruzi.*
***Habitat**: Blood, bone marrow ,L.N, tissue spaces of D.H , R.S*	*Blood , L.N , tissue spaces of D.H , R.H.*
***D.H :** Man.*	*Man.*
***R.H:** Antelopes , dogs , pigs.*	*Armadillo + dog + cat.*
***Insect vector :** Glossina = Tse tse fly.*	*Winged bug = triatomid = triatomid magista*
***D.S:** Polymorphic trypomastigote.*	*All forms w` are - monomorphic trypomastigote.* *- amastigote.* *- promastigote.* *- epimastigote.*
***I.S :** Metacyclic tryponastigote in saliva of glossina.*	*Metacyclic trypomastigote in stool of winged bugs.*
***M/I :** 1- insect bite.* *2- blood transmission.* *3- mechanical transmission during epidemicy.*	*1- contamination of skin abrasion by stool of w.bug containing metacyclic trypomastigote.* *2- blood transfusion.* *3- transplacental.*
Pathogenesis : *1- chronic sleeping sickness { 3 stages } :* *1ry stage : trypanosomal chancre :-* *localized painful nodule at site of bite due to organism multiplication.* *2ry stage : spread of organism to:-* *- blood : rash , fever , headache.* *- tissue spaces:- anemia ,hepatosplenomegaly, lymphadenopathy.* *+ winter bottom sign [هادم] :-* *enlarged L.N , at post. Triangle of neck.* *3rd stage : spread of organism to CNS :*	***1) Acute stage: common in children*** *a- chagoma of skin : localized painful nodule at inoculation site due to organism multiplication.* *b- spread of organism to : 3B-2L-1H [بلح]* *blood :fever B.M : anemia L.N : lymphadenopathy* *liver , spleen :hepatosplenomegaly* *heart : H.F Brain : meningeo-encephalitis* *c- Romana sign : **def**: contamination of eye by T.cruzi by stool of winged bugs .* *C/P : - unilateral edema of eye lid.* *- enlarged epsilateral L.Ns.*

a) early : diffuse meningeo-encephalitis ch` by convulsion , tremor , slow speech due to invasion of brain by trypomastigote :- brain ischemia & petechial Hge. of meninges. b) late :sleeping stage ch` by coma & death.	**2) Chronic stage: common in adults** ch` by : ميجا 4 - cardiomegaly : H.F - mega-oesophagus: dysphagia. - megacolon : constipation. - other mega viscera.
Clinical: **Lab :-** 1\ Direct : ACM [قسم] 1- Animal inoculation. 2- Culture on NNN medium : for detection of polymorphic trypomastigotes. 3- M/E: sample : aspirate L.N , chancre , blood , CSF. stain : giemsa stain. CSF: examination show: a- increase protein & inflammatory cells. b- trypomastigote c- morula cells of mott : oval cell e` evacuolated cytoplasm present in spinal fluid [it is most diagnostic feature]. 2\ Indirect: Serological test : detect Ab in ptn serum [increase IgM].	**Clinical:** **Lab:**1\ direct:[2A ,B ,C , S, X] 1- Animal inoculation : monomorphic T. 2- Culture on NNN medium : same form as vector. 3- Skin biobsy : all forms. 4- Blood film: monomorphic T. 5- L.N Aspiration: amastigote. 6-Xenodiagnosis: by feeding of vector on ptn blood then examine rectum of vector to detect parasite. 2\ Indirect: 1- Serological test. 2-Cruzin test : delayed Rx in +ve cases. 3- Machado – Gurreiro test [CFT]:- Ab + Ag → +ve in 95% of cases. ↘ ↘ liver extract from infected animal. Ptn serum .
Ttt:1- In early stage [CNS no affected]:- البنت -Pentamidine سارة -Suramin : not cross BBB 2- In late stage [CNS affected]:- Melarsoprol: cross BBB 3- In both stage : DFMO [recent drug].	Ttt :بنت P 1- Primaquine : destroy parasite in blood. N 2- Nifurtimox: destroy parasite in tissue. T 3- ttt of megacolon by using surgical method.
control: 1- control of tse tse fly [arthropodمن يكتب] . 2- ttt of ptn & domestic animals. → 3- destroy R.H & animals. →	1- control of winged bugs [arthropodمن يكتب]. 2- same as African trypanosome. 3- same as African trypanosome.

KING OF PARASITOLOGY

other topics هام جدا جدا

Q: compare acute , chronic sleeping sickness?

	Acute S.S	Chronic S.S
Eitiology :	T.rhodesiense.	T.gambiense.
Vector:	Glossina morsitans .	Glossina palpalis = tse tse fly.
R.H :	Wild animals .	Domestic animals.
C/P:	- CNS affected early . - Death occur rapidly.	CNS affect late occur from dse or intercurrent infection.
Animal inoculation :	Susceptible	Refractory
Parasite in blood :	↑ ↑ ↑	↑
Diagnosis:	Posterior nuclear shift phenomenon after animal inoculation.	Posterior nuclear shift phenomenon is rare.
ttt :	Must early suramin.	Discussed before [يكتب] .
Control:	Same as before.	Same as before [يكتب] .

Q : Posterior nuclear shift phenomenon?

Observed after injection of laboratory animal e` ptn blood.

→ Examine animal blood after 7 days to detect polymorphic trypomastigote :-

- If nucleus shifted to posterior end : Acute S.S
- If nucleus not shifted to posterior end : Chronic S.S

KING OF PARASITOLOGY

Balantidium coli [class ciliates]

Habitat: Large intestine of D.H & R.H.
D.H : Man . **D.S:** - Cyst in formed stool.
- Trophozoite in severe diarrhea.
R.H: Pigs . **I.H** : Cyst [D.H , I.S]
M/I: ingestion of contaminated food or H_2O e` cyst.
Dse. : balantidial dysentery = balantidiasis.
Pathogenesis : appear in 3 forms :-
1- Asymptomatic carrier.
2- Acute balantidial dysentery :-
- parasite release : hyaluronidase enzyme → invade colonic mucosa → flsk shaped ulcer → wider than amoebic ulcer → 2ry infection.
- ch` by : dysentery , loss of weight.
- complications : a- ulcer perforation : septic peritonitis → may result in death.
b- liver is affected.

3- Chronic balantidial dysentery.
Diagnosis: - Stool examination for cyst in formed stool.
- Stool examination for trophozoite in diarrhea.

ttt : - metronidazole.
- oxytetracycline.

Control : 3 المعروفين
+ avoid contact e` pigs .
proper washing of vegetables.

Babesia microti [class sporozoa]

Habitat : Human RBCs.
D.H: Hard tick. **D.S :** Ring in pairs or tetrads.
- **I.S :** Sporozoites.
M/I :Hard tick bite.

Pathogenesis: (3/3)
1- Mild cases e` intact spleen: dse is asymptomatic.
2- **In severe cases e` intact spleen : up to 25% of RBCs is infected.**
3- In splenoctonized ptns : fatal & no periodicity as malaria.
C/P: 1- fever , fatigue.
2- pain , headache , myalgia [الم فى العضلات]
هام 3- hemolytic anemia :- jaundice.

Diagnosis:
Clinical: history of exposure to hard tick
Lab: a) Direct: (B, P).
1- detect parasite DNA : by PCR
2- Blood film to detect parasite : appear as small rings inside RBCs that can be differentiate from pl.falciparum by absence
b) Indirect : serological test.
ttt: - compined therapy : [quinine + clindamycin]
- blood transfusion in severe infection.

Control: Tick control [arthropod يكتب من].

KING OF PARASITOLOGY

Toxoplasma gondii (Coccidia)

Habitat: Obligate intracellular parasite [هام جدا] present in RBCs.
D.H : Cats . I.H : Cat , man ,birds.
D.S : tachyzoites.
I.S : 1- tachyzoite.
2- pseudo cyst : contain tachyzoites.
3- true tissue cyst : contain bradyzoites.
4- oocyst : contain sporozoites.
M/I: 1- ingestion of contaminated food or H_2O e` above 1, 2, 3 + 4 mature sporulated oocyst.
2- inhalation of mature sporulated oocyst.
3- 3T – organ Transplantation.
- congenital Transmission.
- blood Transfusion.
Dse. : Toxoplasmosis.
Pathogenesis :
1- Immunocompetent host : asymptomatic.
2- Immunocompromized host : lymphadenopathy e` mild fever.
3- Congenital toxoplasmosis :-
a- due to infection of pregnant mother e` T.gondii.
b- if mother is infected in :-
1st trimester : abortion.
2nd trimester : severe symptoms.
3rd trimester : no or mild symptoms.

Other protozoan parasites

(1) microspondia

Habitat: Small intestine of D.H.
D.H : Man. **R.H :** Farm animal excreta.
D.S : Microspondial spores.
I.S: Microspondial spores.
M/I : 1- ingestion of contaminated food e` animal excreta contain microspondial spores.
2- inhalation of spore.
Dse . : Microspondosis.
Pathogenesis :
1) in immunocomptent host :
- crypts hyperplasia. - villi atrophy of affected area.
- enteropathy e` transient diarrhea.
2) in immunocompromized host :-
a- intestinal microspondosis: enteropathy , diarrhea , spore appear in spore.
b- disseminated microspondosis :-
-eye : keratoconjunctivitis -blood : fever
-kidney : spore in urine -muscle : weakness
-Rs tract : spore in sputum -biliary tract : cholangitis
Diagnosis:
Clinical:
Lab:
1- molecular diagnosis by PCR.
2- Detection of spore in stool , urine , sputum by :
-giemsa stain -trichrome blue stain -E/M
-immuno flurescent method –modified trichrome stain.

C/P : common — less common

- retinochoroiditis — microcephaly
- cerebral calcification — hydrocephalus
- convultion — organomegally

Diagnosis:-

1\ Clinical:

2\ Lab:-

a) direct (2P) : 1- PCR : detect parasite DNA

2- Parasite isolation by injection of blood in mouse & after 7-10 days , examine peritoneal fluid for tachyzoite or cyst.

b) Indirect (2S) : 1- Serological test.

2- Sabin feld man dye test :-

ptn serum + toxoplasma + methylene blue:

If Ab are present in ptn serum : they will bind e` toxoplasma & prevent it from taking dye.

Ttt: 1- Pyrimethamine + trisulfaPyrimidine.

2- Spiramycin : to infected female.

Control : المعروفين 3

+ proper washing of vegetables.
health education.

Ttt : Albendazole.

Control : المعروفين 3

+ avoid contact e` infected cases & infected material
proper washing of vegetables

(2) Blastocystic hominis

Habitat: large intestine of D.H.

Dse. : Blastocytosis.

- affect immunocompromized host [AIDs host] :-

→ diarrhea , fever , colic

Diagnosis : clinical :

Lab:-

1- culture on modified whole egg stant medium + 30 % horse serum : granular & amoeboid form appearance

2- detection of organism in stool by :

-phase contrast microscope - trichrome blue stain

-E/M -simple iodine stain -giemsa stain

ttt : 1st choice : Metronidazole.

2nd choice : Iodoquinol.

KING OF PARASITOLOGY

	Intestinal sarcocytosis (coccidia)	**Muscular sarcocytosis (coccidia)**
	Caused by sarcocystis hominis & suihominis.	Caused by sarcocystis landmani
D.H	Man.	Cat - dog
I.H	Cattle : if S.hominis. pigs : if S.suihominis.	man
D.S	Oocyst – sporocyst.	Sarcocyst in human muscle
I.S	Sarcocyst in muscle of cattle & pigs.	Sporocyst
M/I	Ingestion of improper cooked beef or pork meat infected e` sarcocysts.	Ingestion of contaminated food or H_2O e` dog or cat stool containing sporocysts
Pathogenesis	1- mild infection : asymptomatic 2- severe infection : nausea , vomiting , diarrhea 3-5 hrs after eating meat infected. 3- More severe e` sarcocystis suihominis.	1- same + no inflammatory Rx in muscles. 2- severe infection : damage of cysts : + inflammatory Rx → myalgia ,pericarditis.
Diagnosis	1- stool examination for oocyst , sporocyst. 2- stool concentration by zinc sulphate floatation . 3- intestinal biobsy.	1- muscle biobsy. 2- serological test.
ttt	1- Spiramycin. 2- Cotrimoxazole.	1- Purimethmine + sulphadiazine. 2- Corticosteroids: to – inflammatory Rx.
Control	Proper cooking or deep freezing of meat before eating	Avoid contamination of food e` animal excreta.

KING OF PARASITOLOGY

Cryptosporidiosis (coccidia)	isosporiosis (coccidia)	cyclosporiosis (coccidia)
Caused by : Cryptosporidium parvum	Isospora belli.	Cyclospora cayetanensis.
Habitat : Enterocytes of upper S.I e`in cell membrane.	Inside cytoplasm.	Same. inside cytoplasm.
D.H : Man.		same
D.S : Oocyst.		same
I.S : Mature sporulated oocyst.		same
M/I : - ingestion of oocyst. - inhalation of oocyst. - autoinfection. - nosocomial infection. - traveler`s diarrhea.	- ingestion of oocyst.	- ingestion of oocyst.
ttt: - in immuno comptent host : self limited - in immunocompromized host : a- paromomucin + azithromycin b- fluid & electrolyte balance	Same except : Trimethoprim + sulphamethoxazole	Same except : Trimethoprim + sulphamethoxazole
Pathogenesis & Diagnosis & Control واحد فى الثلاثة (discussed after)		

They cause profuse watery diarrhea *(هام جدا):*

Pathogenesis:

*1- **inflammatory changes**:-*

- crypt hyper plasia *- villous atrophy of affected area*

*2- **Immuno-comptent host** :*

short term rnteropathy e` transient diarrhea (microsponda زى).

***C/P** : a- nausea , vomiting ,anorexia [A, N , V]*

b- Low grade fever

c- profuse watery diarrhea

*3- **In immuno-compromized host [AIDs patients]** :*

a- profuse watery green , affensive diarrhea : reach 25 bowel motion / day

b- malabsorption : due to damage of brush od S.I : severe dehydration & death

*4- **Extra-intestinal infection :***

a- Rs tract .

b- Biliary tract.

c- pancreas.

Diagnosis:

1\ Clinical:

2\ Lab :-

*1) **Direct :** 1- Stool examination : detect oocyst.*

2- Stool concentration: detect oocyst in stool after staining e` (modified Z.N stain) :-
oocyst appear deep red e` blue granules on pale green background.

3- Intestinal biobsy.

*2) **Indirect :** Serological test : detect oocyst by monoclonal flurescent Ab.*

***Control :** same as microspondia.*